MIT's Oldest and Largest Newspaper

thetech.com

The Tech

Established 1881

Volume 136, Number 30

Thursday, October 27, 2016

WEATHER, p. 2

THU: 49°F | 44°F
Evening rain

FRI: 55°F | 41°F
Blustery

SAT: 59°F | 48°F
Chance showers

ROSE WANG

At the Head of the Charles last Saturday and Sunday, MIT Women's Rowing raced along the Charles River.

IN SHORT

Applications for the TBP Service and Engineering Fellowships are due on Sunday, Oct. 30 at 11:59 p.m. The fellowship aims to sponsor MIT community members seeking to pursue a service engineering project this coming IAP.

The annual Pumpkin Drop will take place at 11 p.m. Saturday, Oct. 29 in front of the Green Building.

Family Weekend is this weekend, Oct. 28-29.

Early voting has begun in Massachusetts. If you can, vote!

On Nov. 2, Donald Green, Professor of Political Science at Columbia University, will give a talk titled, "The Science (and Pseudoscience) of Winning Elections" in 54-100 from 3 to 4 p.m.

Send news and tips to *news@tech.mit.edu*.

MIT's Engine will support innovative research, startups

New initiative to target research that venture capitalists overlook

By Patrick Wahl and Vivian Zhong
STAFF REPORTERS

A panel of entrepreneurs and business leaders joined MIT administrators Wednesday night in kickstarting a new initiative created to invest in research with strong long-term potential but less promising short-term profitability.

President L. Rafael Reif introduced the initiative in a speech leading up to a video reveal, which publically named the initiative for the first time: The Engine.

Israel Ruiz, executive vice president and treasurer of MIT, Provost Martin Schmidt, and Anantha Chandrakasan, head of the EECS department, led the effort to realize The Engine, which will function as a separate entity from MIT.

The Engine's starting goal is to raise $150 million to invest in startups and research groups, $25 million of which will come from MIT's own budget. The focus is mainly on "new ventures," specifically those that can't be pursued under university research departments or don't easily attract VC funding, Ruiz said in an interview with *The Tech*.

The Engine will also provide space to funded projects, beginning with 26,000 square feet in its Cambridge headquarters at 501 Massachusetts Avenue. MIT hopes to make available to innovators over 200,000 square feet of space throughout Cambridge, along with equipment and advisory networks which might not be accessible otherwise.

The impetus for the project came primarily from an op-ed written by Reif in *The Washington Post* calling for universities to foster less market-favorable innovation through support and investment, Ruiz said.

Engine, Page 12

Add'l 'computational thinking' course may benefit undergrads

Committee presents three models to integrate requirement into curriculum

By Anshula Gandhi
STAFF REPORTER

A committee of faculty across departments recommended a 12-unit "computational thinking" requirement for all undergraduates, which would cover programming basics.

This requirement would not apply to current students.

The goal of the requirement is to allow students to develop the skills and intellectual framework to "construct or recognize useful, well written algorithms," "implement them," and "use them to model physical, biological, or social systems."

Yet, although computational thinking is broader than programming, the course would cover programming basics.

Topics would cover at a minimum: learning about a specific programming language; fundamentals of programming including loops, recursion, and arrays; programming design principles such as

Computation, Page 13

Smoking litter caused Random roof fire

"Improper disposal of smoking material" was the cause of the Random Hall fire this summer, wrote Jared and Laurie Berezin, Random Hall heads of house, in an email to the dorm's social list. The heads of house suggested implementing a no-smoking policy on the roof, a policy already in place throughout the dorm.

In an email to *The Tech*, the Berezins explained that they had to request this information: they emailed Dennis Collins, the Director of Capital Renewal and Construction asking to check in with the Cambridge Fire Department. Apparently, Collins had seen many cigarette butts the night of the fire when taken up by the Fire Department. It is not clear why it took until now for this to be communicated back to the residents.

The Berezins also expressed enthusiasm that their announcement sparked productive discussions within the community. In replies to the original email, residents expressed concerns that blame was being placed on current residents. It was pointed out that summer residents are often not permanent residents, and also smoked more. Others also pointed out that construction workers, who spent their days on the roof deck, were also seen smoking.

—Olivia Brode-Roger

Solar power grab gets MIT closer to reaching carbon-neutral goal

Purchase of energy, in partnership with Boston institutions, enabled construction of 650-acre North Carolina solar farm

By Patrick Wahl

MIT has partnered with Boston Medical Center and the Post Office Square Redevelopment Corporation to construct a 60-megawatt solar farm on 650 acres of land in North Carolina, demonstrating a new alliance-based model for economically reducing carbon emissions.

The facility, called Summit Farms, is expected to be fully operational with 255,000 solar panels by the end of 2016, and will provide power under the current agreement for 25 years. It will produce an estimated 146 gigawatt-hours of electrical power per year.

MIT will purchase an amount of power from the farm equal to 40 percent of the power it currently consumes from the energy grid, while BMC and POS will purchase amounts equivalent to 100 percent of their respective energy consumptions.

This will reduce MIT's carbon emissions by 17 percent from their 2014 baseline levels, fulfilling more than half of the Institute's goal to curtail campus emissions by 32 percent by 2030. In comparison, on-campus solar power reduces emissions only by only one to three percent.

Summit Farms is the largest ever renewable energy purchase made through the cooperation of mixed-industry buyers. "What we're really most excited about is the partnership model that this creates," Joe Higgins, director of infrastructure

Solar, Page 13

Alcohol and Drug Survey

To view the full results of *The Tech*'s survey, visit *https://thetech.com/*.

Email *news@tech.mit.edu* or visit *The Tech* (W20-483) between 7 p.m. and 10 p.m. any weekday until Nov. 1 with questions or comments.

A DIFFERENT BEAT
Leaving the typical path. **CAMPUS LIFE, p. 8**

MOZART PROVOKED
An intimate ballet. **ARTS, p. 11**

PAGU: A LIFESTYLE
New restaurant to open near Random. **ARTS, p. 11**

MOUNTAINS SURROUND US
A tale of three women. **ARTS, p. 10**

CUBS VS. INDIANS
Ten team advantages that could tip the series either way. **SPORTS, p. 15**

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Fun Pages 5
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Arts 10
Sports 16

WEATHER

Weekend will be warmer, windy, and wet

By Vince Agard
STAFF METEOROLOGIST

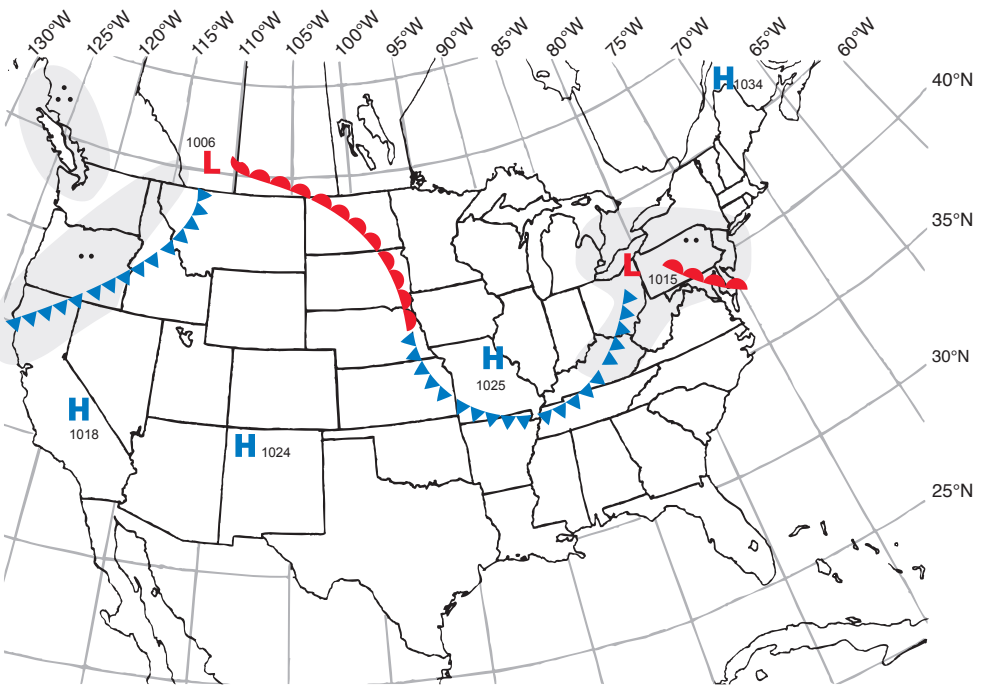
After a string of chilly days in which temperatures were almost 10°F below normal, the Boston area will see a return this weekend to temperatures more appropriate for late October. However, this warm-up will be accompanied by some stormy weather, as an unsettled pattern takes hold. The best chance for rain will come tonight, as the first of two low pressure systems passes over New England from the west. Rain will begin in the late afternoon today, with winds increasing overnight. The rain will taper off after sunrise tomorrow, but strong winds will continue throughout the day.

The second chance for rain will come on Saturday night as a second low pressure system passes to our north. This will be a weaker system, and the lack of a direct hit will cause rain totals to be much lower than for tonight's storm. Expect just a chance of showers from Saturday afternoon and evening, then another slight chance of rain on Sunday.

Any rain that does fall this weekend will help to alleviate the extreme drought currently in progress over more than one-third of the state of Massachusetts. In Boston, the total rainfall to date in 2016 is currently 9.5 inches below its normal level.

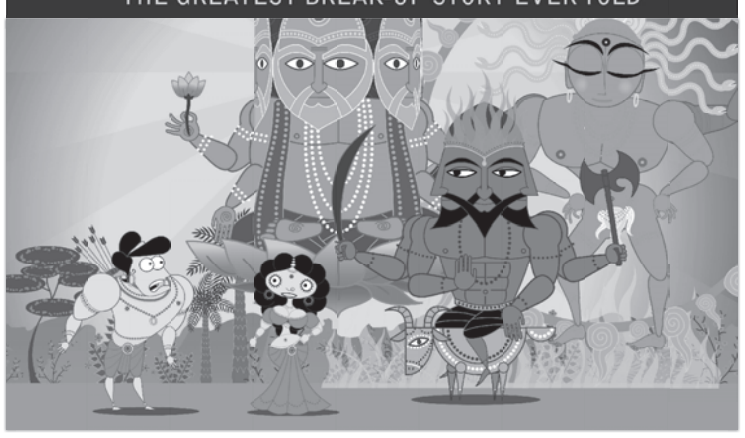
Extended Forecast

Today: Morning sunshine giving way to rain in the late afternoon, high 49°F (9°C). Winds N at 5-10 mph, becoming E.
Tonight: Rain and wind, low 44°F (7°C). Winds SE at 15-25 mph, gusting higher.
Tomorrow: Blustery with rain early, then partly cloudy. High 55°F (13°C). Winds NW at 15-25 mph, gusting to 35 mph.
Saturday: Partly cloudy with a chance of showers in the afternoon and evening. Highs in the upper 50s °F (15°C).
Sunday: Mostly sunny, highs in the mid 50s °F (14°C).



Situation for Noon Eastern Time, Thursday, October 27, 2016

Weather Systems	Weather Fronts	Precipitation Symbols	Other Symbols
H High Pressure	Trough	Snow / Rain	Fog
L Low Pressure	Warm Front	Showers	Thunderstorm
§ Hurricane	Cold Front	Light	Haze
	Stationary Front	Moderate	Compiled by MIT Meteorology Staff and *The Tech*
		Heavy	

secular society of MIT
OUT AND OUT
OF HINDUISM
PART OF THE "OUT AND OUT" SERIES OF SECULAR COMMUNITY FEAST EVENTS
FREE SECULAR *DIWALI* DINNER
SCREENING: NINA PALEY'S ANIMATED MUSICAL-COMEDIC *RAMAYANA*
FILM DISCUSSION: MYTHOLOGY | RELIGION | SECULARISM | FEMINISM
RAFFLE GIVEAWAY: OFFICIAL HIGH-QUALITY FILM STILL POSTER
sita sings the blues
THE GREATEST BREAK-UP STORY EVER TOLD

TUE, NOV 1ST | 7PM | 4-237

Solution to Batter

from page 6

1	7	8	9	2	5	4	6	3
6	9	2	3	1	4	8	7	5
3	4	5	7	8	6	1	2	9
7	1	9	2	4	3	5	8	6
4	8	6	1	5	7	3	9	2
2	5	3	6	9	8	7	1	4
9	3	1	4	7	2	6	5	8
5	2	4	8	6	1	9	3	7
8	6	7	5	3	9	2	4	1

Solution to Shortstop

from page 6

7	3	5	9	1	4	2	6	8
8	1	6	5	2	3	9	7	4
4	2	9	6	7	8	3	5	1
2	5	8	4	6	7	1	9	3
1	6	4	8	3	9	7	2	5
3	9	7	2	5	1	4	8	6
6	7	1	3	9	5	8	4	2
5	8	3	7	4	2	6	1	9
9	4	2	1	8	6	5	3	7

Solution to Ozone

from page 5

D	O	G	G	■	S	T	O	W	■	P	O	O	C	H
I	D	O	L	■	H	O	W	E	■	O	C	H	O	A
S	O	T	O	■	O	R	A	L	■	C	H	O	P	S
C	R	O	S	S	W	O	R	D	B	O	O	K	S	■
■	■	■	S	L	R	■	■	S	O	N	■	■	■	■
M	I	A	■	O	O	P	S	■	S	O	L	O	N	G
C	B	S	S	P	O	R	T	S	■	S	E	N	O	R
A	S	T	O	■	M	O	O	L	A	■	E	T	N	A
T	E	R	S	E	■	F	O	O	L	P	R	O	O	F
S	N	O	O	P	S	■	D	E	C	O	■	P	S	T
■	■	■	I	R	A	■	■	I	O	N	■	■	■	■
■	O	L	D	L	O	N	D	O	N	F	O	O	D	S
F	R	O	Y	O	■	G	O	L	D	■	O	R	E	O
A	L	O	N	G	■	L	O	G	O	■	K	E	N	O
T	Y	K	E	S	■	O	M	A	R	■	S	S	G	T

STARR FORUM
HONOR KILLINGS
Why They Won't End

Rafia Zakaria
Author of *The Upstairs Wife: An Intimate History of Pakistan* and columnist for *Dawn*
Oct 27, 2016 | 4:30 - 6:00
MIT 3-270 | 33 Mass Ave, Cambridge
MIT CENTER FOR INTERNATIONAL STUDIES
web.mit.edu/cis | starrforum@mit.edu | free and open to the public

Israeli Dance
Beginner's Classes!
Wed Nov 2: Lobdell Dining Hall
Wed Nov 9: Stud Ctr 491
Wed Nov 16: Lobdell Dining Hall
7:30 - 8:30 pm
followed by open dancing
Free for all students.
Suggested donation $1 from the public.
http://mit.edu/fdc

DUE for a RECHARGE

WEDNESDAY, NOV. 2
11:30 AM - 3:00 PM

Take a break and recharge with the friendly folks in DUE.

Drop by as many locations as you want for activities, snacks, and a chance to win great prizes!

Balloon Pop Portraits
EDGERTON CENTER 4-408

Bubble Gum & Bubble Wrap
ADMISSIONS 3-103

Cookies & Crafts
UNDERGRADUATE ADVISING & ACADEMIC PROGRAMMING 7-103

Good Fortune
STUDENT FINANCIAL SERVICES 11-103

Hugs & Hot Chocolate
OFFICE OF MINORITY EDUCATION 4-107

Play Time
GLOBAL EDUCATION & CAREER DEVELOPMENT 5-135

Puzzles & Coloring
REGISTRAR'S OFFICE 5-117, 5-122

Sponsored by

DUE Office of the Dean for Undergraduate Education

MIT

Latino Cultural Center

Cena a Las Seis

From Our Family to Yours!

The MIT Latino Cultural Center invites you to join us for Cena a Las Seis ("Dinner at Six")

Cena is an annual-semi formal event hosted by the Latino Cultural Center during MIT's Family Weekend.

This year it will be held on:

Saturday, October 29th from 6-9pm in Walker Memorial

Join us for a fun and eventful evening filled with delicious Latin Cuisine, traditional dances, and good times with fellow Latin students, parents, faculty, and alumni. Everyone is welcome! We hope to see you there celebrating with our Latinx *familia!*

R.S.V.P @ latino.mit.edu
sponsored by the OME, OMP, and LEF

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The **Smithsonian's Innoskate program** travels the country celebrating inventive creativity in skate culture. In collaboration with the Lemelson-MIT Program, *Innoskate 2016* comes to the MIT and Lynch Family Skatepark in Cambridge to spark the imagination of skaters and non-skaters of all ages.

Intersections of Innovation

Friday, October 28 5:30PM – 7:00PM
MIT Stata Center (Building 32, Room 123)

In this MIT Master Class, legendary skateboarder Rodney Mullen and innovative filmmaker/photographer Steven Sebring discuss their collaboration, Liminal, and how, by fusing together their passion and creativity, they ended up pushing the boundaries of their respective disciplines. Joining them in the conversation are MIT's Allan Adams, lecturer in physics and research scientist in comparative media studies, and Anette (Peko) Hosoi, professor of mechanical engineering.

Public Festival

Saturday, October 29 11:00AM – 4:00PM
Lynch Family Skatepark in Cambridge, MA

Innoskate 2016 at the Lynch Family Skatepark will spark the imagination of skaters and non-skaters of all ages through skate demonstrations, discussions with skaters and inventors, hands-on invention educational activities, public skating, food trucks and a best trick contest. Learn about invention and creativity in skateboarding with skaters, historians, inventors and scientists from the Smithsonian and MIT.

Learn more: lemelson.mit.edu/events

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UNITED STATES PATENT AND TRADEMARK OFFICE uspto
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COMMUNITY PARTNERS
Charles River Conservancy
Formlabs
Lynch Family Skatepark
MIT Edgerton Center
Tech Imaging

KENSHO

transform() the world to fit() the future

```
X = SparseAutoEncoder(num_hidden=10).fit_transform(features)
xycoords = TSNE(random_state=17).fit_transform(X)
DBS = cluster.DBSCAN().fit(X)
plt.scatter(xycoords[:, 0],  xycoords[:, 1], color=colors[DBS.labels_])
```

affinity for:
machine learning | data science | math | statistics
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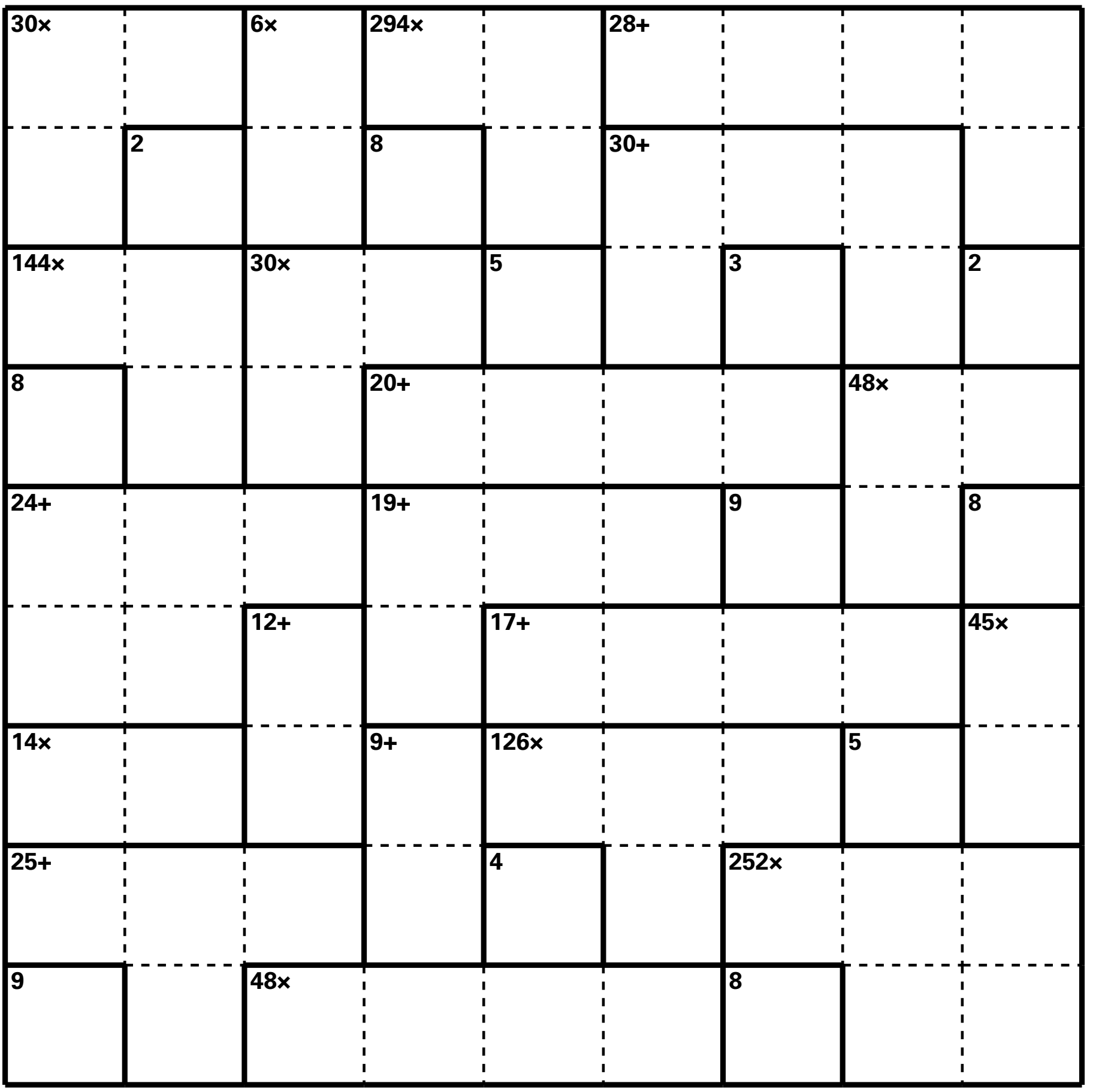
Mascot

Solution, page 12



Instructions: Fill in the grid so that each column and row contains exactly one of each of the numbers 1–9. Follow the mathematical operations for each box.

Ozone by S.N.

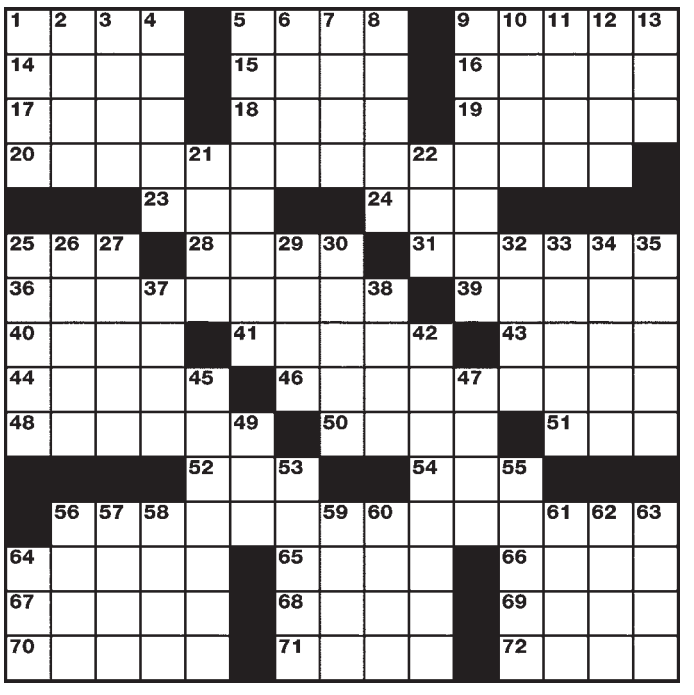
Solution, page 2

ACROSS

1 Big name in rap music
5 Tuck away
9 Four-legged friend
14 Reality show, for short
15 Suffragist/lyricist
16 Mexican-born LPGA great
17 Explorer de __
18 Voiced
19 Musical talent, so to speak
20 Plane passengers' bring-alongs
23 Photography designation
24 Trinity member
25 South Fla. airport
28 "Didn't mean to do that"
31 Parting phrase
36 Longtime Masters airer
39 Hombre español
40 In the matter of
41 Bucks
43 Landmark near Messina
44 Wasting no words
46 Guaranteed to work
48 Asks too much
50 Retro design style
51 What Wash. will be on in Dec.
52 Savings acronym
54 Charged bit
56 Melba toast maker
64 Cool treat
65 Alchemist's obsession
66 1 Down-shaped treat
67 In the entourage
68 Corporate icon
69 Powerball relative
70 Small fry
71 Karl, in Patton
72 USMC rank

DOWN

1 Sort of circular object
2 Baking soda target
3 Attend
4 Paint asset
5 Retail setup
6 Mower maker
7 Man __ (Seabiscuit's grandsire)
8 Skyscraper joints
9 Pennsylvania peaks
10 Spanish skating figure
11 "Well, I can't object"
12 Reneges, with "out"
13 Contains
21 Mean cuisine
22 AL East team
25 Exams for some chem. majors
26 World's #2 most-performed playwright
27 Prefix for nautical
29 TA's boss
30 Uprighted oneself
32 Oblique observation
33 Sitting pretty
34 Prohibitions
35 Horticultural cutting
37 Lackluster
38 Nectarine cousin
42 Abdul-Jabbar's birth name
45 Literary codas
47 "And it vanished!"
49 Sign of a boffo show
53 It can mean "British"
55 Nestling places
56 Air France secondary hub
57 Appear or appearance
58 Smidge of force



59 End of an Indy Jones title
60 Nicholas II's eldest
61 Mined-over matter
62 '80s Chinese leader
63 Diesel by-product
64 Plentiful

FUNFUNFUNF

FUNFUNFUNF

THE WELCH FOUNDATION CELEBRATES OUTSTANDING ACHIEVEMENTS IN CHEMISTRY

The Robert A. Welch Award in Chemistry is presented annually by The Welch Foundation to foster and encourage basic chemical research and to recognize the value of chemical research contributions for the benefit of humankind. **The Welch Foundation proudly bestows the 2016 award on Dr. Richard H. Holm and Dr. Stephen J. Lippard.**

Both recipients are pioneers in the field of bioinorganic chemistry, exploring the critical connection between metals and biology.

As the Higgins Research Professor at Harvard University, Dr. Holm has spent decades exploring the role of metals in biological processes. Renowned for his commitment to scientific integrity and passion for problem solving, Dr. Holm helped establish the knowledge, tools and techniques that power today's chemical researchers.

Dr. Lippard, the Arthur Amos Noyes Professor of Chemistry at Massachusetts Institute of Technology, has devoted his career to studying the roles of metals in key functions related to energy and health. Dr. Lippard's notable projects have included the understanding and improvement of drugs—including the widely-used cancer treatment cisplatin.

Drs. Holm and Lippard will share the $500,000 Welch Award.

THE Welch FOUNDATION
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welch1.org | Houston

Growing up clueless

Class from both sides of the divide

By John W. Belcher

Editor's note: Off the Beaten Path is a series that shares stories from members of the MIT community from working-class backgrounds. Comments, questions, and submissions are welcome at cl@tech.mit.edu.

Although I was born in Louisiana, I grew up mostly in Texas. When I was growing up, my father was a "roughneck" in the West Texas oilfields. My dad only finished up to the 7th grade. Both he and my mom came from large farming families (12 children each). I was really shy and spent most of my formative years buried in the Ector County Public Library in Odessa, Texas.

I had no idea what I was doing when I applied to college. I applied to exactly one school: Rice University in Houston. My first term at Rice in fall of 1961 was really rough; my high school did not offer calculus, so I was competing in a freshman calculus course with students who had already had calculus. But after a lot of struggle, I ended up doing OK at Rice.

After Rice, I went off to Caltech for graduate school. After a lot of struggle at Caltech, I ended up doing OK there, too. I got a postdoctoral position at MIT and then a faculty position here. After a lot of struggle, I ended up doing OK at MIT and got tenure.

Just after I came to MIT, the Space Plasma Group wrote a proposal for a plasma instrument on the Voyager mission to the outer planets. I spent most of my research career working with data from this instrument, and I eventually became the Principal Investigator during the Neptune encounter. Presently, the two spacecraft are about three times further from the Sun than Pluto is. The Voyager 2 MIT plasma instrument is still returning data to this day, almost 40 years after launch, and will very likely be making historic measurements in the interstellar medium in the next few years. Voyager is one of the most successful unmanned space missions of all time.

So I have had a very lucky existence professionally.

I want to offer up some reflections and inevitably some advice to first generation students about how to get to where I am. Let me first emphasize the word "lucky" in the sentence above. There is so much serendipity in how I ended up a tenured MIT professor that it is hard to overstate the importance of "luck." I can look back over my life and see so many times when I just happened to be in the right place at the right time.

For example, one of the criteria for tenure is that the candidate must write a research paper that "changes the direction of the field." I wrote a paper that was published in *The Astrophysical Journal* that did just that. At about the same time that my paper came out, a very similar paper was published in a European journal. If I had waited another six months to submit my paper, it would not have been accepted because it would no longer have been original. I would not have gotten credit for "changing the direction of the field," and I probably would not have gotten tenure at MIT.

Frequently, I made the "right" choice even though I had almost no idea of what I was doing or what the implications were for me. That does not mean that I did not work hard and do not have a modicum of talent. It simply means that those two attributes are not centrally important in terms of what I have achieved. They were necessary, but not sufficient.

PING XU—THE TECH

Professor John Belcher.

> **There is so much serendipity in how I ended up a tenured MIT professor that it is hard to overstate the importance of "luck."**

The second thing I would emphasize when I look back is the importance of mentors. Good mentorship started with my mom and dad, included my junior high school and high school teachers, my professors at Rice, my thesis advisor at Caltech, and my faculty mentor at MIT. My parents had no idea of how to set me on the path to academic success — they hardly knew what the word "academics" meant. But they did encourage me to do my best. Later on, my various teachers and mentors *did* know what "academic" success meant and how to achieve it, and they guided me when I did not have a clue as to what was going on or what I needed to do to succeed.

So you need to find mentors, whether it be in your fellow students, MIT staff, or MIT faculty. Try to get close to people who you think know what is going on, even if you don't. By and large people who have "made it" are amazingly willing to help other people do the same — but they can't do that unless you make yourself visible.

Get to know personnel in the UAAP (Undergraduate Advising and Academic Program) if you are a freshman, as well as the departmental academic staff when you have declared a major. They know the system, they know the faculty and the faculty culture, and they are an amazing font of wisdom. To get to know faculty, go up after class and ask a question, or go to office hours, or say hello in the hall to them. Even if that makes you vulnerable to rejection, and sometimes you will be rejected, it is an important thing to do.

If you come from a first generation background, the other thing that is really important to do is to not underestimate yourself. Don't be your own worst critic. Coming from a first generation family into MIT is first and foremost an enormous shift in class, and it can be profoundly disorienting. One of the more common reactions to that shift is "impostor syndrome" — thinking that you don't belong here, that somebody made a mistake.

I can tell you about imposter syndrome in minute detail. For years after I got tenure at MIT, I secretly thought someone had made a mistake, and they would take tenure back when they figured out I was not as smart as I pretended to be. Seriously. After many decades with tenure, after sitting in on many tenure committees at the Institute, I have enough intellectual perspective to know exactly why I got tenure and why I deserved it. But believe me, it took me a long time to come to that knowledge. Until you come to that level of wisdom at age 50 or so, don't succumb to the feeling of being an imposter. You are not. And eventually you will understand that, even if you do not understand that now.

> **For years after I got tenure at MIT, I secretly thought someone had made a mistake, and they would take tenure back when they figured out I was not as smart as I pretended to be.**

A related observation about impostor syndrome is that I have seen the class divide from both sides now — I raised my children, who are now 37 and 40, in Lexington, a suburb outside of Boston. Lexington is a wealthy suburb, full of academically and professionally accomplished parents, with great schools. But there is a downside to that because of the pressures on young people there to get to what seems like an impossibly high standard of achievement. If I could go back and make the choice between being raised in Odessa and being raised in Lexington, I would frankly have a hard time deciding which one to choose. Six of one, half a dozen of the other.

The final word of advice I would offer, not only to first generation students but to all students, is to ask for help if you think you are in over your head. I have written about my own bout with clinical depression elsewhere, and I will not repeat those details here. But sometimes you just need to get out of your head and talk to someone you trust, whether that person is another student, a staff member, a faculty member, someone from S^3, or a mental health clinician. All students, especially first generation students, do not want to be seen as needing help — they want to be seen as in control and swimming along effortlessly. If that is not the case for you, and believe me, at one point in my life this was emphatically not the case for me, ask for help. I did, and it made all the difference in the world.

John W. Belcher is a professor in the physics department.

MIT APPLICATION ESSAYS THAT WORKED

Marching to a different beat

By Laser Nite

Editor's note: This is part of a series of MIT application essays submitted by students who were later admitted to the Institute. The following prompts are from the 2013-14 admissions season.

Prompt

Please tell us more about your cultural background and identity in the space below. (100 words)

Response

My genes are over 99 percent identical to every other Homo Sapiens. I live in a progressive meditation community in Fairfield, Iowa, that is rich in eastern philosophy. I did not grow up in a particularly religious household, but my parents have been interested in New Age phenomena for as long as I can remember. I was not directly exposed, however, until I moved to Fairfield. Fortunately, my skepticism was met with love, bliss, reason and direct experience of the development of consciousness. A diverse, global community has gathered in Fairfield, for the wonderful lives these principles and meditation create.

Prompt

We know you lead a busy life, full of activities, many of which are required of you. Tell us about something you do simply for the pleasure of it. (100 words or fewer)

Response

Well, last night I went sledding with a bunch of friends then we came back to my house two thirds frozen and jumped in my hot tub and listened to music. Then we jumped out half naked and made snow angels before sprinting back to the warmth of the water. Fun night.

I also really love meditation. The daily experiences I have are unlike anything else in my life. They vary widely, so it's always interesting and fun, yet they are consistently blissful and rejuvenating. My meditation allows me to enter activity with vigor and joy for life!

Prompt

Tell us about the most significant challenge you've faced or something important that didn't go according to plan. How did you manage the situation? (200-250 words)

Response

Choosing between continuing my traditional high school education and diverging from the beaten path to pursue what I thought would bring greater knowledge, skill, and bliss was probably the most difficult choice I have ever made. The conflict between what I felt and rationally knew to be right, and what society was telling me to do, was enormous. Many people thought my judgement was poor, and I at times had doubts. I felt like I was throwing away everything I had worked hard for since I was a kindergartener, by breaking the system. I have yet to be admitted to any colleges, so I still do not know the full consequences of my actions, but I do know that regardless, choosing to leave is one of the best decisions I have ever made. If I had not broken off to gain the knowledge and experience I needed, I would not be the person I am today, and I feel fantastic. I gained so much so quickly, that I soon knew that I had made the right choice. Before I left my school, however, I was still carrying the dogma of and attachment to an educational system that was not serving me or humanity. Marching to the beat of a different drummer is not easy for anyone, especially someone who has investments in the current song. Fortunately, eastern philosophy and meditation assisted me in letting go, and as soon as I did follow my heart, great things happened.

—Laser Nite '18

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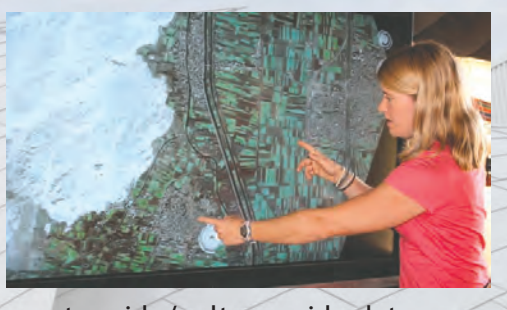
2016-2017 Dertouzos Lecture Series

Hacking archaeology: beyond shovels or iSandbox?

Sarah Parcak, Spectral Globe



Date: Wednesday, November 2, 2016
Venue: MIT Stata Center, Building 32-123/Kirsch Auditorium
Time: 4:30PM (refreshments at 4:15PM)

Abstract: Archaeology is now beginning to enter the age of "big data", where countrywide/culture-wide data are available, yet archaeologists are only beginning to develop appropriate computational tools to handle and evaluate them. Compared to many other fields, archaeology has only just begun to be "hacked", with 3D printing, satellite imagery, crowdsourcing, and new digital recording techniques. What else could be done on the ground using low cost sensors and robots? This talk will present the current state of archaeology and discuss new and innovative and approaches being used at diverse ancient sites. It will suggest areas where using sensors could potentially change the field, making fieldwork more efficient, inexpensive, and accessible to a broader audience. The talk will also show how the analysis of high resolution satellite images (using specific algorithms) can be combined with on the ground sensors to improve site mapping and feature discovery, focusing on Egypt and Peru as case studies. How new 3D modelling approaches using open source software may change the field will also be discussed.

Bio: Sarah Parcak is an Associate Professor of Anthropology at the University of Alabama at Birmingham (UAB) and is the Founding Director of the UAB Laboratory for Global Observation. She is the author of *Satellite Remote Sensing for Archaeology* (Routledge 2009). Her research represents the first large-scale landscape archaeology approaches to the field of Egyptology. Her remote sensing work has been the focus of two BBC-Discovery Channel specials on the use of satellite remote sensing in Archaeology: Egypt's Lost Cities (2011), and Rome: What Lies Beneath (2012). She has published numerous peer-reviewed papers and presented at conferences and symposia across the globe. Sarah is the 2016 TED Prize winner, a National Geographic Fellow, a TED Senior Fellow, and a Fellow of the Society of Antiquaries.

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RESTAURANT OPENING

The crazy pug lady and life-changing granola

New restaurant PAGU opening near Random Hall

By Alexandra Sourakov
ASSOCIATE ARTS EDITOR

"I'm the crazy pug lady. My pug is my muse," proclaims chef Tracy Cheng, in response to my question about the name of her soon-to-be-opened restaurant. The name Pagu comes from the Japanese word for "pug." The way Tracy sees it, it's "a name that will last and that you can say in any language." But before you get any ideas, "it's not just a restaurant. Pagu is a philosophy." If you've read cooking memoirs by the likes of Anthony Bourdain or Julia Child, you've probably already been struck by the fact that chefs are a pretty philosophical bunch.

Tracy has known since fifth grade that she would open her own restaurant. She was influenced by her grandmother's Cambridge-based restaurant, Tokyo. Her culinary adventures sound like they'd make a pretty epic movie. She's worked in a Michelin three-star restaurant in San Sebastian, Spain, where chef Martine took her under his wing. She's studied *patisserie* (pastry) at the renowned Le Cordon Bleu in Paris. From there, Tracy brought her culinary chops back to Boston. She's done everything from ramen pop-up dinners and teaching the Harvard course, Science + Cooking.

If one hears that Pagu's menu is influenced by Japanese and Spanish culinary traditions, one might be tempted to call it "fusion," but Tracy isn't sure that's the best word to describe it. It makes it seem that these are two polarizing forces being forced together. "I mean, what is fusion? Is Tex-Mex fusion? Is General Tso's chicken? Maybe synthesis is a better way of looking at it," she said.

Pagu (the restaurant and the philosophy) is about "connecting the dots." The menu draws upon the "less is more" approach present in both Spanish and Japanese cuisine, as well as the focus on seafood and precision.

One thing you should know when walking into Pagu is that every single thing that your eye happens to fall upon has been deliberated on with intense scrutiny by Tracy and her collaborators. The layout of the restaurant is a work of art in itself. As Tracy and I poured over the mockup in the midst of the construction project, she pointed out the aspects that were especially important to her: the centrality of the kitchen, the flexibility of the table arrangements, the variety of experiences available. There are moveable tables, which can transform from one long Hogwarts-style dining table to many little ones, calling to mind molecular or robotic self-assembly. There are countertop seats as well as tables for standing. The kitchen is the first thing that meets your eye when you enter. It is encircled by counters that are so close to where the magic happens that patrons can (and are encouraged to) engage the chefs in conversation, as their meal is prepared.

Tracy envisions Pagu as a place radiating warmth, thus embodying the comfort of hearth and home, but also as an intersection of the arts and tech. Every detail is not simply a means to end, but a statement in itself. The doors, for example, are made using a traditional Japanese style that consists of braising the wood to strengthen it — "there's a certain poetry in that." Bronze beavers will be on the back of the door, facing MIT. If you've been there before, the wait staff will have memorized your name.

The design has been curated in such a way as to facilitate conversation between strangers — filling the niche that coffee shops occupied in the eighteenth century (today's coffee shops are more of a place to take your laptop out for a walk). The way Tracy sees it, there are conversations that are just poised to happen, connections that are inches away from being made, and all that people need is a catalyst. Food can be that catalyst. Good food has a story. Good food starts conversations.

That's actually how Tracy met MIT professor John Bush, who has been a prominent collaborator in Pagu. From across the room, she heard the words "San Sebastian," "croissant," and "*pinchos*" (tapas' northern cousin), all in one sentence. It was like a homing call to a pigeon. She and "JB" became fast friends. Tracy's description of the dinner party she hosted, as a sort of preview of Pagu for all those involved in the project (her "tribe), sounded absolutely surreal. I was shown a video of John Bush playing Tibetan singing bowls that were full of a flaming beverage from Western Spain. A man named Brother Cleve in a purple suit and a feather in his fedora mixed the drinks.

The restaurant will capture a wide variety of experiences: it will have a coffee bar with a delectable selection of pastries throughout the day; it will offer lunch; and in the evening, Tracy's experience in fine-dining will provide the ultimate experience, whether you're ordering drinks, pinchos, or dinner. The goal, Tracy says, is to "evoke nostalgia rather than make new memories." One of the dishes on the menu that is closest to her heart is called "Childhood Fried Rice." It's the first thing she learned to cook and it reminds her of the time spent cooking and competing with her family.

After hearing the vibrant stories Tracy told me of the journey that's brought her to this point and her quest to bring community and a truly different food experience to Cambridge, I had the impression of watching a jazz-like syncopation, not a fusion. Pagu will be a very welcome infusion into the gustatory landscape of MIT. If the food at Pagu is of the same caliber as the parting gift of granola that Tracy gave me (which was Batch #88 on the quest for recreating a "life-changing granola" she experienced in California), it will be very worth a visit when it opens in late fall.

MOVIE REVIEW

Paper Lanterns: an awe-inspiring tale of compassion across cultures

Shigeaki Mori's decades of research pay off in dividends

Paper Lanterns
Directed By Barry Frechette
Museum of Fine Arts Screening, Oct. 19, 2016

By Ivy Li

There are remarkably telling things in verbal language: the rhythm of intonations, the patterns of stress, the emotional resonance that is felt rather than spoken aloud. Even more telling are the words of the hero of Paper Lanterns, Japanese historian Shigeaki Mori, who, despite language and cultural barriers, spent over thirty years researching the fates of twelve American prisoner of war (POW) victims of the Hiroshima bombing.

As an eight year old boy, Mori witnessed countless deaths during the bombing — burnt and scarred bodies both on land and floating in the river that he'd fallen into. The victims he could not save inspired his future work as a historian and efforts in providing closure to these victims' families, in spite of their American origins.

Among the twelve victims, *Paper Lanterns* centers around Normand Brissette and Ralph Neal, two American POW victims, including interviews with members of their families, who shared their gratitude to Mori for his compassion and dedication. The meetings between Mori and these family members are some of the most sincere in the film, because a difference in language did not mean a difference in heart.

As the interviewees explain, Mori discovered that the American victims were not recognized among Japan's memorials and consequently set about registering the victims' names, tracing their histories and families, and creating a memorial where there was none. During the Q&A session after the screening, director Barry Frechette explained that Mori took a night job as a security guard to pay for this memorial because he otherwise was not able to get the necessary funding.

The film also showed Mori calling the 50 states of the United States, spending every weekend for over 20 years calling phone numbers from the phone book using the little information he could find on the American POWs. Because he was unable to speak English, he relied heavily on operators to get in touch with the victims' families. Some of the families did not want to talk about the incident, but many were grateful to finally find out what had happened to their loved ones.

The documentary is a testament to forgiveness and compassion, as victims of callous war remain fellow human beings no matter their nationality. The last scene in the film depicted Mori's meeting with President Obama on May 27, 2016. After giving a warm address to the Japanese people, President Obama embraces Mori, recognizing him for his contributions and bringing this train of compassion full circle. Seventy years have passed since that mushroom cloud loomed above, but these past mistakes remain relevant and there is still work to be done.

The conclusion of the screening was met with applause, as Frechette and his crew came up to answer audience questions. Their passion for this film was commendable: from their inclusion of Japanese instruments in the score to their choice to not dub over Mori's voice and to only use subtitles. As the crew agrees, Mori's voice lends a certain emotional cadence to the film, and to remove his words in favor of an English voiceover would remove this aspect entirely.

Paper Lanterns was funded by a Kickstarter campaign, allowing Frechette and some of his team to travel to Japan to visit the sites and speak directly with Mori. Their ultimate goal was to have this film spread through the education system, to teach students about their history and that in spite of the past, peace is possible through acts of compassion and kindness, even between supposed enemies. They have managed to get *Paper Lanterns* shown in several Japanese schools and are looking to spread their message further.

Perhaps the most touching question asked by an audience member was whether Mori had seen the film. Frechette explained that they had invited Mori to watch one of the screenings with them. As his life's work was shown to him, Mori began to weep.

BALLET REVIEW

In Sanctuary Theatre, a religious setting for an intimate ballet

Impelling Forces opens 2016 season of Jose Mateo Ballet Theatre

Impelling Forces
Jose Mateo Ballet Theatre
Oct. 14-30

By Ray Wang
STAFF WRITER

Tucked away inside the Old Cambridge Baptist Church near Harvard Square, the Sanctuary Theatre is home to the small company of the Jose Mateo Ballet Theatre. Below arching church rafters, a bare rehearsal floor was the stage for Impelling Forces, one of four ballets in the company's 2016-17 season, entitled "Inner Space Adventures."

I entered this quaint venue on an October evening of torrential rain. Two-person round tables populated half of the dance floor in a cabaret-style arrangement, and performers occupied the other. I was seated at the front, and the performers were, at their closest, 15 feet away from my seat. This intimacy afforded me the rare opportunity to notice every detail of the dancers — their expressions, their form, the exertion of their muscles.

The first act was *Mozart Provoked*, to the music of a reimagined Sonata in C Major for Piano. The rearrangement was intriguing — it schizophrenically strung new phrases into the piece, altering the cadence and flow of the melody constantly. Almost jazzy, the music drove the energetic choreography.

In the second act, to Beethoven's Cello Sonata No. 2 in G Minor, dancer Spencer Doru Keith stood out as the most talented and athletic. He bounded airily across the stage, and his leaps attained impressive height and ended in light, graceful landings.

Madeleine Bonn, a member of the company since 2004, was rock solid as a soloist in the second act. Her traveling turns were precise and smooth. Angie Dewolf, also a 12-year veteran, had multiple solos and duets in the second and third acts. While she had a lot of time in the spotlight, I felt that she could have done much more with her arms and frame to be more expressive.

The last act, *Over and Over*, featured some excellent group choreography to the minimalist, tense music of Philip Glass. Involving all the members of the troupe in waves of dancers ebbing and flowing across the stage, this dance showcased the company's range of abilities.

A fine local discovery, Jose Mateo is a very small group by all measurements (16 dancers were listed in the program), but it affords some welcome intimacy in a unique, almost hidden nook of Harvard Square.

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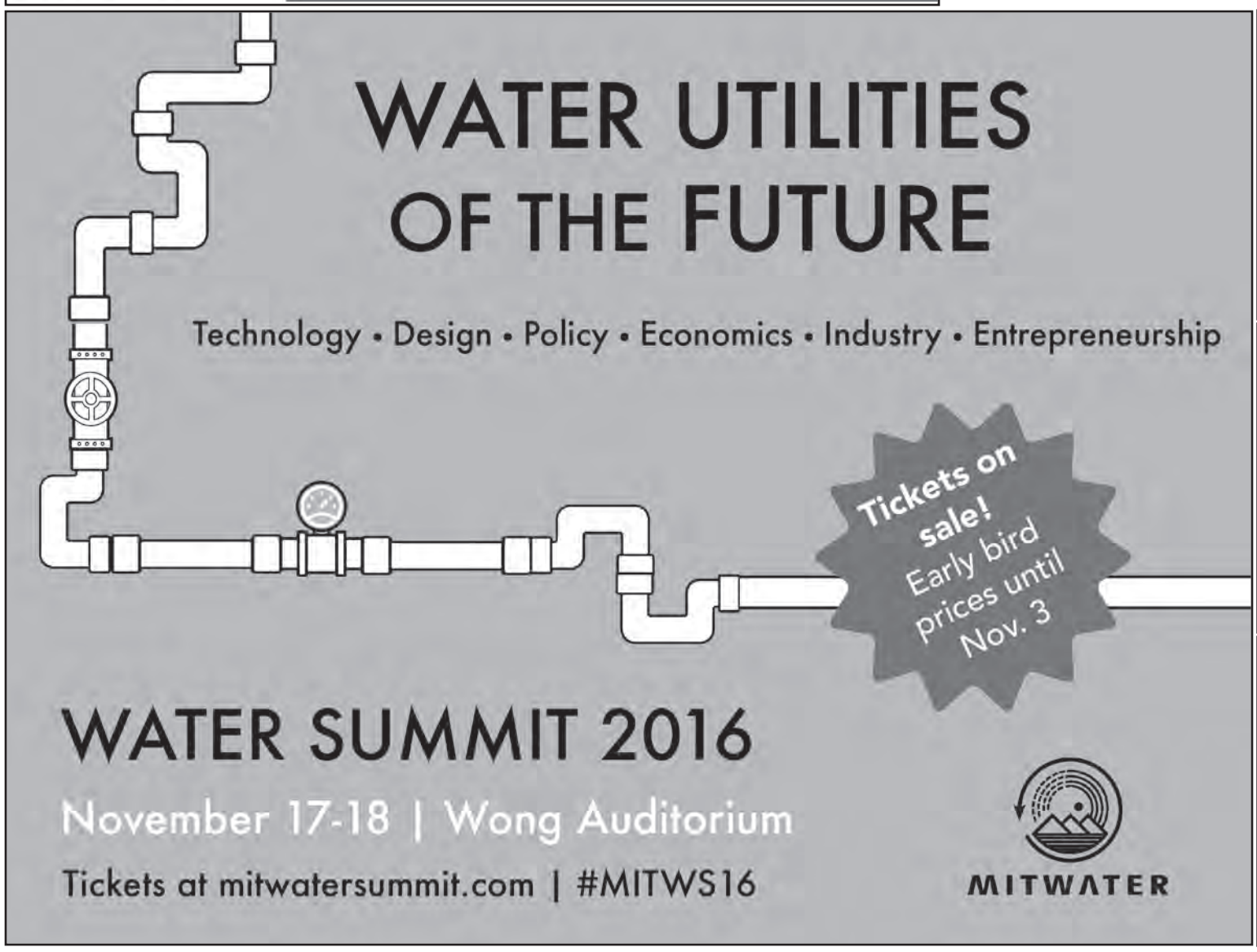
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The Engine plans to support 60 groups starting this spring

Panelists: partnerships between academia and industry can take de-risked ideas into the market

Engine, from Page 1

"The market's not serving that need. The venture capital model really focuses on something else... it works really well, but it doesn't serve this," Schmidt said. "This is why, to some extent, MIT... feels the need to step in and fill this gap.

The Engine also represents the latest entry in a series of MIT programs aimed at improving the innovative commercial and research spheres on and around campus, Schmidt said. These programs include the MIT Venture Mentoring Service, the Martin Trust Center for MIT Entrepreneurship, and the Deshpande Center.

Though the government still plays an important role in funding R&D for high-capital, long-term innovations, it sometimes has trouble identifying worthy projects due to lack of technical expertise. "We've worked with federal and state government to really amplify the effect of that research," Ruiz said.

The Engine will be open to startups from all around the Cambridge/Boston area. Ruiz hopes that The Engine can also provide help with visa issues for international students.

The Engine came together over the last 18 to 24 months, having started early May 2015. Its leadership hopes to have facilities, starting with 501 Mass Ave, operational, and to have investors and startups on board by the spring. Ruiz said that the administration is already engaged in talks with potential corporate investors.

A panel discussion followed Reif's speech, with input from Sue Siegel, CEO of GE Venture; Antonio Rodriguez, general partner at Matrix Partner; Phillip Sharp, MIT Institute Professor and co-founder of Biogen; Leslie Dewan PhD '13, co-founder and CEO of Transatomic Power; Jay Bradner, president of the Novartis Institutes for Biomedical Research; and Guru Banavar, vice president and chief science officer for cognitive computing at IBM.

Like the start-ups targeted by The Engine, Novartis is in it "for the long haul," Bradner said.

Siegel focused on the The Engine's potential for smoothing friction between academic and corporate institutions through bringing them together in partnership.

Asked for recommendations for the direction of The Engine, Dewan highlighted the importance of using existing infrastructure and partnering with local public institutions such as hospitals. Banavar emphasized that "lowering barrier entry for innovators is utterly crucial."

The panel was followed by short pitches by six start-ups, all of which were started by graduates or affiliates of MIT. Of the six, Transatomic, a company that's developing a molten salt reactor that can generate carbon-free, low-cost nuclear power, seems most in line with The Engine's purported mission.

Details about the initiative were kept relatively secret in the months leading up to last night's announcement. Staff in the MIT News office could not refer to the initiative by name, referring to it instead by a code name, according to Rob Matheson, an MIT News writer.

The event organizers, however, were not above scattering a few hints for the event attendees: the Wifi networks at the event were named "combustion-2.4" and "ignition-2.4."

Solution to Mascot

from page 5

5	1	2	7	6	9	4	8	3
6	2	3	8	7	1	5	9	4
4	9	1	6	5	8	3	7	2
8	4	5	1	9	3	7	2	6
1	6	7	3	2	5	9	4	8
7	3	4	9	8	2	6	1	5
2	7	8	4	3	6	1	5	9
3	8	9	5	4	7	2	6	1
9	5	6	2	1	4	8	3	7

Solution to Pitcher

from page 6

1	6	5	3	4	2
5	4	3	1	2	6
3	2	1	5	6	4
2	1	6	4	5	3
4	3	2	6	1	5
6	5	4	2	3	1

Solution to Catcher

from page 6

3	2	6	4	1	5
4	3	1	5	2	6
2	1	5	3	6	4
5	4	2	6	3	1
1	6	4	2	5	3
6	5	3	1	4	2

Opinions sought on potential Course 6-style requirement

However, committee fears another required class could negatively affect students' 'work and lives'

Computation, from Page 1

modularity and abstraction; categories of algorithms including greedy, divide-and-conquer, and hill climbing; and modeling and visualizations.

Other topics that may be explored in such a requirement include understanding the limits of computers and using algorithms to enrich art and design.

Computational thinking, according to the draft report published by the committee in September, goes beyond learning a programming language or tools like Microsoft Office. More than programming syntax, it is a mode of thinking.

Edsger Dijkstra, a notable computer scientist, thought similarly when he stated that "computer science is no more about computers than astronomy is about telescopes."

The committee argued that the widespread use of computers means that even students who are not computer science majors should be aware of the major issues in the field. The requirement is not being offered solely for "pragmatic advantages" that computational tools can offer in classes and careers, members emphasized. Rather, computational thinking provides a unique intellectual framework and can aid in communicating precisely. Thus, as a mode of thinking, it is beneficial for all disciplines.

Many departments do support a requirement for all MIT undergraduates to develop computational skills. Departments in support of the requirement include Economics, Brain and Cognitive Sciences, Physics, Biology, Music, and Architecture. The committee drafting the report itself included faculty from EECS, Physics, Music and Theater Arts, Mechanical Engineering, Architecture, Sloan, and Chemistry.

But some faculty do not agree. A few groups surveyed felt that students in their discipline would not benefit from computational thinking.

Almost 80 percent of last year's senior class graduated having taken a computational class. Seventy-seven percent took a computational course due to degree requirements, and 1.6 percent took it optionally.

To increase the number of students graduating with computation experience to 100 percent, the institution proposed three possible variations of the requirement.

One possible variation of the requirement would be a single subject that surveys computational thinking. A concern is that vast differences in prior computational experience will cause some students to struggle and others to be bored in the class. The committee doesn't recommend this option.

Another potential variation of the requirement would be a disciplinary-specific computation course. A concern is that some departments may not have resources to develop such courses. Still, the committee states this option is "worth considering."

Another alternative would be a 6-unit interdepartmental class, followed by a 6-unit discipline-specific class. Again, a concern is that some departments may not have resources to develop such courses. Nonetheless, the committee finds this option the most favorable.

One pitfall of any class covering such topics, however, may be an unintended and disproportionate emphasis on programming syntax and other low-level details, rather than on a mode of thinking.

Despite advantages of computational thinking training, the committee recognized that they "cannot reasonably expect MIT students to add another graduation requirement without negatively impacting their work and lives." Thus, the committee explored some workarounds to lighten the student load.

Allowing people to test out of the requirement is a possibility. However, this places a disproportionate burden on students who went to high schools with lower academic standards, and therefore on students who would already be struggling.

Making one GIR optional was another way the committee considered lightening the load. However, this would undermine the point of adding a GIR – all students would not necessarily graduate with computational thinking skills.

The committee found the most favorable option changing one of the two REST (Restricted Elective in Science and Technology) requirements to a computation requirement.

If MIT were to implement an undergraduate-wide computational requirement, it would be the only one among its peer institutions, besides Harvey Mudd, to do so. The committee thus stressed the "opportunity for MIT to lead the way in formalizing the expansion of education in computational thinking."

Dijkstra agreed that computer science shapes our thinking when he stated that "It is not only the violin that shapes the violinist, we are all shaped by the tools we train ourselves to use, and in this respect programming languages have a devious influence: they shape our thinking habits."

Before drafting the report, the group asked for feedback from all faculty members and students. They received feedback from seventeen faculty members and two students.

Further feedback on the proposed requirement may be sent to *computation-study-group@mit.edu*.

17% reduction in carbon emissions

BMC will become the first carbon-neutral hospital in New England

Solar, from Page 1

business operations, said in an interview with *The Tech*. He emphasized that other entities which might otherwise lack the leveraging power to invest in clean energy can learn from the model. "They'll have significant emissions reductions that they're trying to achieve… but they can't do it alone," Higgins said.

MIT, BMC, and POS are partnered through A Better City, a group of 130 Boston-area businesses working to promote economic health and sustainability. CustomerFirst Renewables, a renewable energy solutions firm, organized and consulted on the project. Dominion Resources, a Virginia-based power company, capitalized and will maintain the facility. SunEnergy1 will handle the construction of the solar array.

The partnership considered 41 projects before deciding on Summit Farms. The project was selected in part for the size of the land area - at approximately four times the size of MIT's campus, an array of similar size would not be nearly as feasible in the Northeast. Transmission lines also run directly through the project site, so that minimal infrastructure will need to be created to connect it to the power grid.

The North Carolina power grid is also significantly more dependant on fossil fuels than that of New England, so constructing the facility there will displace an even greater number of emissions. In addition, developer SunEnergy1 has "a huge track record of being successful and delivering these types of projects," according to Higgins.

The project is expected to be entirely cost-neutral for the three participating organizations. The alliance will pay a fixed price to Dominion for the production of the power, and will receive wholesale electricity market revenue in return.

Additionally, the organizations will receive quantities of Renewable Energy Certificates from Dominion proportional to the amount of energy they purchase. The certificates can be sold as a form of subsidy for buying renewable energy.

The announcement of the project comes in the wake of studies that show atmospheric levels of carbon dioxide have reached potentially irreversible levels of 400 parts per million.

"This is a demonstration as to how organizations have an opportunity to contribute to reducing emissions, whether it is locally or whether it's outside of our own grid. Our emissions must be reduced," Julie Newman, director of sustainability, said. Higgins offered evidence of progress in this area, adding that, "more than 95 percent of new energy capacity in 2016 was renewable."

The cities of Boston and Cambridge have emissions reduction goals of 50 percent and 80 percent, respectively, by 2050. "They realize that we're not going to get there just with building efficiency alone, we've got to start looking at these large-scale renewable energy projects," Higgins said.

Summit Farms will additionally serve as a potential location for MIT researchers to conduct experiments. Replicas of the panels there will be built on campus so that data from the two locations can be compared.

Real-time data will be collected from the facility and made available to researchers. MIT faculty members from various departments plan to discuss how the data can be utilized. "There's a huge research and educational opportunity there that we're taking advantage of," Higgins said.

Boston Medical Center is 496-bed medical center located in Boston's South End. It will become the first carbon-neutral hospital in New England upon completion of the project.

Post Office Square Redevelopment Corporation oversees Norman B. Leventhal Park and its underground parking garage in the Financial District.

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World Series 2016: why each team could win

By Ahaan Rungta
SPORTS STAFF

After six months of regular and postseason play, the 2016 World Series will see two teams competing, neither of which have experienced a championship in a very long time. The Chicago Cubs will try to break their 108-year curse, and the Cleveland Indians will try to break a curse of their own by becoming the latest city to win two sports championships in the same year (alongside LeBron James' Cavaliers).

No matter which side becomes the new champion, their city wil have an incredible story. With baseball fans around the country picking sides and bets flying over the internet, this World Series is anticipated to be nothing short of thrilling. Thought its events are impossible to foresee, here are the top five reasons to believe that each team will win the World Series.

Chicago Cubs (NL):

#5: Defense

One of the best defensive units in the Major Leagues, the Cubs defense has done it all – saved games, made games, turned the tables around for the opponents, and most recently set the tone in NLCS games against the Dodgers. They have several gold glove candidates and multiple players in Kris Bryant and Ben Zobrist who can play multiple positions around the field. Manager Joe Maddon will definitely not have brick gloves as one of his concerns over the World Series.

#4: It's their year

With the best regular season team across the majors with a record of 103-58, this Cubs team has carried a level of consistent play in all angles of the game. Their endurance, tenacity, and depth in young talent has strengthened the team into one that was unflustered by changes such as the injury of Kyle Schwarber and the decline of veteran Jason Heyward. They've seen enough adversity even in the playoffs so far that it's hard imagining a situation that they would not be able to commandeer.

#3: Pitching to Pressure

To say that the Cubs have a lot of experience in their clubhouse is a massive understatement. Despite the struggles of Jason Heyward, his presence among the young players has been advertised as a key part of the endurance of the team. Anthony Rizzo has also stepped up as a leading force in the Cubs offense. However, most of the attention must come to the starting rotation of the Cubs, with the reigning NL Cy Young winner Jake Arrieta being perhaps the coldest arm in their rotation right now.

In two NLCS starts against the Dodgers, Cy Young candidate Kyle Hendricks shone, allowing just one run. However, the ace of the staff recently has not been Arrieta or Hendricks. Rather, it's been NLCS co-MVP Cy Young candidate Jon Lester. A two-time world champion with the Boston Red Sox, Lester has come up clutch in the past for the Red Sox and this year with the Cubs. Nothing has flustered him. The Dodgers' mind games and the Giants' Cueto were not enough to beat Lester as he still holds a career 2.50 postseason ERA and 0.43 World Series ERA before this World Series. To guess that Lester would choke in the playoffs suggests a lottery ticket.

John Lackey is a force to contend with as well. With his win in Game 6 of the 2013 World Series with the Red Sox, Lackey became the first starting pitcher in major league history to be the winner of two World Series-clinching games with two different teams. Could he make it three with the Cubs? The Indians definitely aren't going to have it easy.

#2: Kyle Schwarber

The 23-year old left-handed batting stud Schwarber was severely injured at the beginning of the regular season and he missed almost the entirety of the year with multiple torn ligaments. After recovering smoothly and playing some Arizona Fall League ball, the Cubs see him as a major threat in the middle of the lineup, filling the designated hitter role at Progressive Field with AL rules.

The possibility of Schwarber being completely unprepared for a return to the MLB exists. However, when the Indians have to visit Wrigley Field without the DH, they will most likely either have to force Mike Napoli's hand at left field or play without the benefit of both Carlos Santana and Mike Napoli in the starting lineup, making the Cubs' road situation seem much less tricky. Schwarber definitely cannot hurt the Cubs' chances and if he clicks, he could be the biggest RBI force during the World Series.

#1: Theo Epstein

A name at the tip of the tongue of every Boston Red Sox fan, Cubs President of Baseball Operations Theo Epstein knows a thing or two about breaking "curses" – he ended the 86-year Boston Red Sox drought by building a dynamic team from the farm and up. He's done the same with the Chicago Cubs. Not only has he pulled young talent out of seemingly nowhere, he's reunited with familiar faces from the Red Sox such as Anthony Rizzo and Jon Lester to add the veteran experience that gives the Cubs the depth they have. It's hard to doubt a team built by Epstein – he could simply be a genius.

Cleveland Indians (AL):

#5: Less pressure

In almost any World Series matchup that includes the Indians, the lack of a championship since 1948 would have all eyes on Cleveland. However, with the Chicago Cubs in the limelight trying to reap the benefits of their first NL pennant since 1945, the Indians are grabbing less attention than their opponents, allowing their staff to work as underdogs – that's how they've liked it all season.

#4: Home sweet home

Even if the all-star game doesn't have serious implications, the Indians and Cubs both have significantly better records at home than they do on the road. If it comes down to a Game 7, Progressive Field is probably going to play a significant role in the outcome.

#3: Running game

The biggest base-stealers in baseball have a lot to think about against the Cubs batteries, especially Lester and Ross. Rajai Davis, Coco Crisp, Francisco Lindor, and Tyler Naquin are just a few of the many thefts in the lineup. Even Mike Napoli, known to be one of the smartest yet slowest baserunners, has spent his fair share of time around Lester and Lackey. The Indians were the second-best run-scoring offense in the MLB and a good chunk of the credit goes to their aggressive, decisive trips around the basepaths.

#2: Terry Francona

Like Theo Epstein of the Cubs, Terry Francona also comes from a Red Sox team that broke the curse. A clear candidate for the AL Manager of the Year award in 2016, Terry Francona has managed his bullpen like no other in the playoffs. If there's any man that can out-think him, it's probably Joe Maddon, but the Cubs have a reigning Manager of the Year with not as much experience as the Indians manager when it comes to winning the championship. Francona's been there, done that – and don't forget, if the Indians can win 3 games, Francona's 8-3 record in playoff closeout games will only be looking to improve further.

#1: A bullpen that kills

Needless to say, the Indians have the most dominant bullpen in baseball – flawless in the postseason so far. Games in which the Indians have the lead past the fourth inning seem to be virtually over.

Known primarily for their starting pitching at the beginning of the season, the Cleveland Indians lost starters Danny Salazar and Carlos Carrasco to injuries. While Salazar returns to the rotation for the World Series, a torn-up Trevor Bauer and a streaky Josh Tomlin beg for Terry Francona to depend on his bullpen, which hasn't led him down yet.

The leader of the pack is the only lefty in the bullpen for the Indians, ALCS MVP Andrew Miller. Traded from the New York Yankees at the deadline and leaving his role as closer, Miller has dissected the dominant offensive charges of the Boston Red Sox and the Toronto Blue Jays with ease. He'll be faced with many right-handed hitters and switch-hitters but so far, the most devastating slider in baseball has been automatic, handing the closing job to Cody Allen who has been perfect at the big stage.

Who has the advantage? Which city will come away *finally victorious*? You can decide for yourself and watch the best-of-7 series on Fox Sports on game nights at 8 p.m.

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